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MEASUREMENT AND CLASSIFICATION OF TEACHER ATTITUDES TOWARD ADULT ILLITERATES.

BY- JOHNSON, RAYMOND L. AND OTHERS

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AS A FIRST STEP IN A STUDY OF THE ROLE OF ATTITUDE AND ATTITUDE CHANGE AS A VARIABLE IN THE INTERACTION BETWEEN BASIC LITERACY TEACHERS AND THEIR ADULT STUDENTS, A GENERAL PROCEDURE FOR THE CLASSIFICATION OF ATTITUDES BY DETECTING "ATTITUDE CLUSTERS" WAS DEVELOPED. THIS REPORT DISCUSSES HOW THE MEMBER COMPONENTS OF CLUSTERS MAY BE REPRESENTED AS A SIMPLE CLOSED STRUCTURE CALLED A CIRCUMPLEX. CLUSTER ANALYSIS AND THE CONSTRUCTION OF A CIRCUMPLEX WERE USED WITH GROUP DATA OBTAINED FROM A CLASS OF 23 YOUNG NEGRO WOMEN TEACHER TRAINEES IN ADULT BASIC EDUCATION. THIS METHOD IS ALSO APPROPRIATE FOR INTENSIVE STUDY OF A SINGLE SUBJECT. EACH TRAINEE COMPLETED A 100-ITEM ATTITUDE SCALE AT THE BEGINNING OF A 1-WEEK ORIENTATION AND TRAINING COURSE, AND AGAIN AT THE END OF THE COURSE. RESPONDENTS' JUDGMENT FOR EACH ITEM WAS MADE ON A SEVEN-POINT BI-POLAR "TRUE OR FALSE" SCALE, WITH INTERVALS NUMBERED CONSECUTIVELY FROM ONE THROUGH SEVEN. THIS REPORT INCLUDES THE ATTITUDE SCALE USED AND CIRCULANT CORRELATION MATRICES, AND DISCUSSIONS ON THE DETECTION OF CLUSTERS AND THE CONSTRUCTION OF THE CIRCUMPLEX. (AJ)

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MEASUREMENT AND CLASSIFICATION OF TEACHER ATTITUDES TOWARD ADULT ILLITERATES

Raymond L. Johnson, Washington School of Psychiatry
Richard W. Cortright, Laubach Literacy
Jessie V. Cooper, Adult Basic Education, D. C. Public Schools

Current theoretical models of attitude change are expressed in predominantly structural terms, with the components (i.e., belief statements) seen as interlinking elements in a system. A change in attitude is viewed as resulting from an inbalance in this system and any shift must conform to the existing structure. To begin a study of the role of attitude and attitude change as a variable in the interaction between basic literacy teachers and their adult students, we first had to develop methods for measuring and classifying attitudes which permitted a structural representation of the data. In this report, we describe a general procedure for the classification of attitudes by detecting "attitude clusters" (a method appropriate both for the intensive study of a single subject and for the analysis of group data) and demonstrate that the member components of clusters may be represented as a simple closed structure called a circumplex. Cluster analysis and the construction of a circumplex is illustrated with group data obtained from a class of teacher trainees in basic adult education.

Twenty-three teachers, employed part-time to teach basic reading skills to urban adult illiterates, were asked to complete a 100 item attitude scale at the beginning of a brief one week orientation and training course, and again at the end of the course. The teacher trainees were, for the most part, young Negro women recently graduated from college, without previous teaching experience. Respondents' judgement for each item was made on a seven point bi-polar "true or false" scale, with intervals numbered consecutively from one through seven.

A. Detection of Clusters.

1. Items are considered geometrically as points in a data space, and response similarity between any pair of items ($\underline{i}$ and $\underline{j}$) expressed as a "psychological distance" (D_{ij}), computed using the metric

$$D_{ij} = \sum_{k=1}^{23} |a_{ik} - a_{jk}|$$

where a_{ik} is teacher $\underline{k}$'s response to item $\underline{i}$ and a_{jk} is teacher $\underline{k}$'s response to item $\underline{j}$. Signs are disregarded. D_{ij} is computed between each item $\underline{i}$ and every other item $\underline{j}$. Those items which elicited very similar responses are separated by small distances and items which elicited very different patterns of responses are separated by large distances.

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2. Histograms are compiled for each item i, showing the distributions of distances to all other items j. A point embedded in a cluster of points will exhibit an early peaking histogram, showing that a number of points j are within a short distance of i.

3. A complementary method of detecting clusters is to compute density values. With point i as a center point and distance (D) to each point j serving in turn as a radius, a density measure (G_i) is computed, using the formula

$$G_i = P_{ij}/D_{ij}^{s}.$$

where P_{ij} is the number of points within distance D_{ij} of point i; D_{ij} is the distance from the center of the cluster, i, to point j (i.e., the "radius" of the cluster); and s is the number of degrees of freedom, corresponding to the effective dimensionality of the space. The distance, D_{ij}, which produces the maximum value of G_i determines the cluster of maximum density. Those points j which were found in the most dense regions about i constitute a cluster with i as its center-most point.

4. To assign any isolated or borderline points to clusters, we compute the probability that a point belongs to a cluster.

Analysis of the teacher attitude data yielded four discrete, well defined clusters which were interpreted as representing their views concerning

(a) the illiterate's isolation and withdrawal from his surroundings
(b) the social chasm which separates the teacher and student
(c) the strategies for successful teaching
(d) the illiterate's failures as a "style of life."

In the structural modeling of the data described below, Circumplex I is based on teachers' responses to the attitude scale at the time of its first administration. Following the second administration, 24 items were selected which tended to minimize test/retest variability and maximize the within-group disagreement. These items, which entered into the construction of II and III, are listed as the short form of the attitude scale.

B. Construction of a circumplex.

A circulant is a symmetric correlation matrix which can be so ordered that the largest correlations occur along the main diagonal and in the lower-left and upper-right corners. Starting at the diagonal cell in each row and column, the correlations are seen to decrease in size and then to increase as one again approaches the diagonal. A matrix satisfying these conditions represents a circular rank ordering of items and may be graphically depicted on a plane surface as a circumplex. Comparing a circulant correlation matrix with its circumplex, it is seen that contiguous items are always positively

correlated. As one moves around the circumplex, the correlations between any particular item and the other remaining items first decrease with distance, and then increase again as one approaches it on the other side. The negative correlations between items on opposite sides of the circumplex imply that attitudinal components are bi-polar, an important perspective on the data which is not gained from cluster analysis alone.

There is, nevertheless, a close relationship between these two approaches to attitude classification since the notion of clusters is inherent in a matrix which exhibits "circumplicial" form. Our study of the teacher attitude data suggest that

1. Distance values, D_{ij}, are interchangeable with correlations. For example, Circumplex II is represented both by a circulant distance matrix and by a circulant correlation matrix. The magnitude of the distance varies with the size of the correlation: large positive correlation coefficients, small distance values; large negative correlations, large distances.

2. There may be no unique circulant matrix for a given set of response data. Circumplex II and III are based on the same data, yet have no items in common.

3. When a single cluster contributes more than one item to a circulant matrix, the items will usually occupy contiguous positions on the circumplex. For Circumplex I, for example, items 6 and 22 are members of one cluster; 24, 21, and 23 belong to another; while 15 and 23 are drawn from still a third cluster. Item 4 is the sole representative of its cluster.

The circumplex is useful in its capacity to link together conceptually a number of different scale items. Each item becomes more meaningful and interpretable when it is seen - not as an isolated element - but embedded in a network of relationships. Furthermore, this structural model of an attitude domain requires that a shift in one attitudinal component be attended by shifts in others and the model permits us to formulate hypotheses about the specific components involved in attitude change and the direction of each shift.

*Note: A package of computer programs for cluster analysis is available for the IBM 1401. The programs are entitled "Classification Using Rating Form Data" (PID number D3118) and have been depositied with the IBM Program Information Department, 40 Saw Mill River Road, Hawthorne, New York, 10532. They have been further described in an IBM Application Brief, "Computer Assisted Language Content Analysis at Walter Reed Army Institute of Research, Washington, D. C."

Teacher Attitudes Toward Adult Illiterates: Short Form

1. Teachers find it difficult to hold the interest of adult literacy students.

   TRUE : : : : : : : FALSE

2. Illiterates tend to watch TV and listen to the radio less often than do literate adults.

3. There are fewer difficulties if men students are assigned to men teachers.

4. Adult students learn better if the teacher adheres strictly to a highly structured and organized lesson plan.

5. Students usually know the alphabet before they begin literacy instruction.

6. Students usually blame their illiteracy on unpleasant school experiences.

7. Students sometimes distrust the motives of their teachers.

8. Adult students prefer teachers of the all-business, no nonsense type.

9. Young teachers often have difficulty establishing good rapport with older adult students.

10. Differences in social class often make the establishing of good rapport between student and teacher very difficult.

11. Adults find it easier to learn to read than do children.

12. Illiterates often subscribe to newspapers and popular magazines even though they can not read them.

13. Elementary school teachers tend to make the best adult literacy teachers.

14. Adult illiterates who are Negroes usually show little interest in the Civil Rights movement.

15. Adult illiterates tend to be the "black sheep" in their families.

16. Adult students are often tardy in coming to class.

17. Illiterates tend to have unrealistic hopes for their children's futures.

18. Illiterates have difficulty learning the social role of "student" in the student-teacher relationship.

19. Illiterates have difficulty understanding what other people say to them.

20. Many illiterates are alcoholics.

21. Illiterates tend to be emotionally immature.

22. Illiterates often have no real appreciation of the advantages of being able to read.

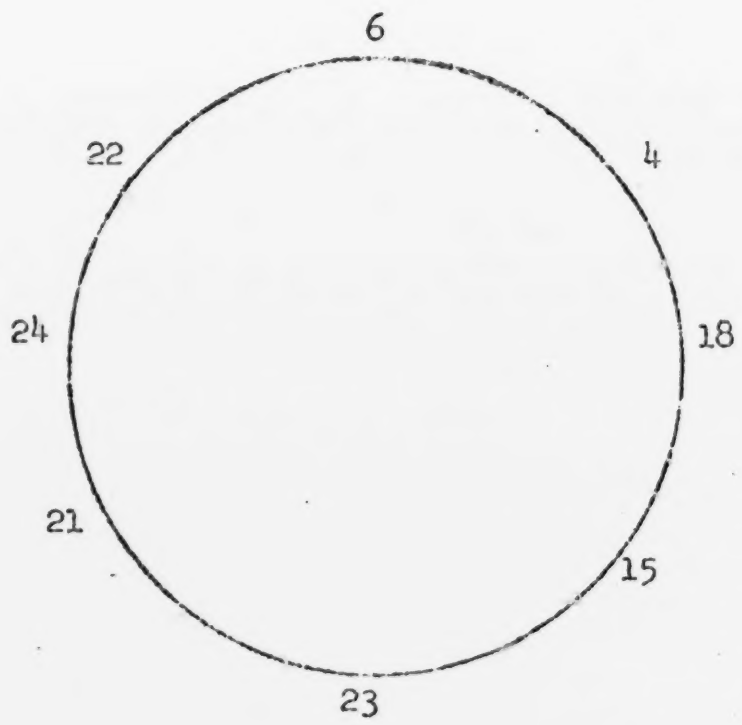
23. Illiterates are more apt to suffer from mental illness than are most average people.

24. Most illiterates once knew how to read and write a little, but forgot.

Circulant Correlation Matrix for Circumplex II

	4	16	20	15	6	12
4	1.0	486	423	-172	166	349
16	486	1.0	263	030	-136	205
20	423	263	1.0	247	-031	-051
15	-172	030	247	1.0	350	-077
6	166	-136	-031	350	1.0	260
12	349	205	-051	-077	260	1.0

CIRCUMPLEX I



6. Students usually blame their illiteracy on unpleasant school experiences.
4. Adult students learn better if the teacher adheres strictly to a highly structured and organized lesson plan.
18. Illiterates have difficulty learning the social role of "student" in the student-teacher relationship.
15. Adult illiterates tend to be the "black sheep" in their families.
23. Illiterates are more apt to suffer from mental illness than are most average people.
21. Illiterates tend to be emotionally immature.
24. Most illiterates once knew how to read and write a little, but forgot.
22. Illiterates often have no real appreciation of the advantages of being able to read.

Circulant Correlation Matrix for Circumplex I

	6	4	18	15	23	21	24	22
6	1.0	509	172	-330	-216	-179	308	314
4	509	1.0	492	-274	-216	-214	-074	175
18	172	492	1.0	110	011	-011	-334	148
15	-330	-274	110	1.0	263	176	-224	-502
23	-216	-216	011	263	1.0	358	249	-322
21	-179	-214	-011	176	358	1.0	309	018
24	308	-074	-334	-224	249	309	1.0	229
22	314	175	148	-500	-322	018	229	1.0

Cluster Analysis of Data Represented by Circumplex II and III

CLUSTER I

Nucleus (point i) Item 12
Maximum Density .151

Member Point (j)	Distance from i to j	Correlation between i and j
Item 9	38	389
Item 1	42	273
Item 7	46	158
Item 13	50	198
Item 14	52	016
Item 2	53	104
Item 19	53	092

CLUSTER II

Nucleus (point i) Item 3
Maximum Density .080

Item 20	30	556
Item 10	40	395
Item 11	50	310

CLUSTER III

Nucleus (point i) Item 5
Maximum Density .081

Item 16	33	553
Item 4	37	453

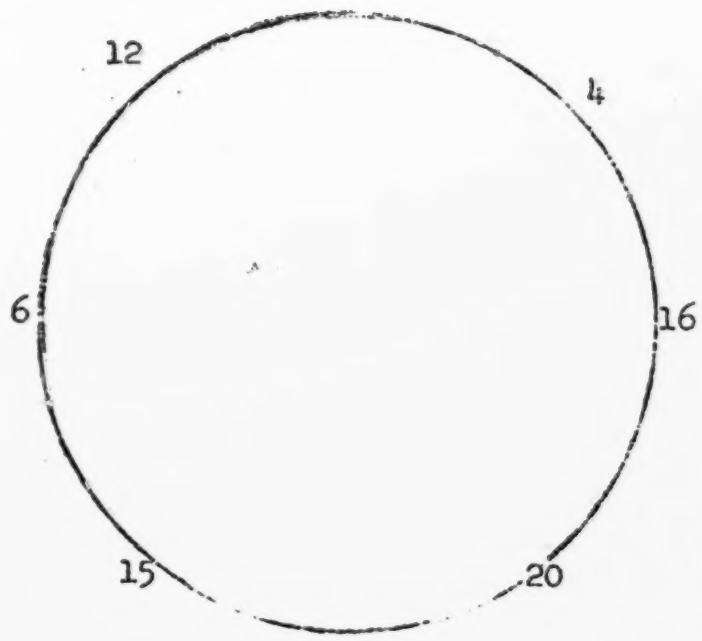
CLUSTER IV

Nucleus (point i) Item 17
Maximum Density .100

Item 15	29	513
Item 6	36	466
Item 8	38	377
Item 18	37	465

(decimals omitted)

CIRCUMPLEX II

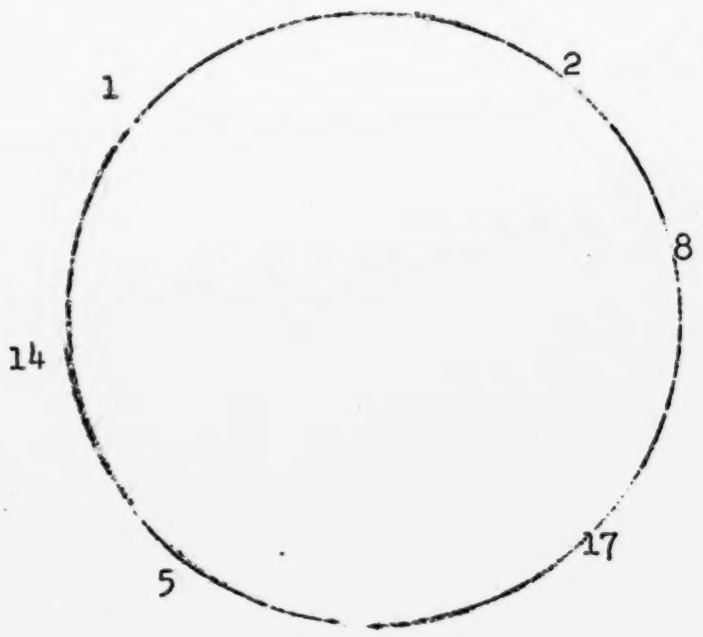


4. Adult students learn better if the teacher adheres strictly to a highly structured and organized lesson plan.
16. Adult students are often tardy in coming to class.
20. Many illiterates are alcoholics.
15. Adult illiterates tend to be the "black sheep" in their families.
6. Students usually blame their illiteracy on unpleasant school experiences.
12. Illiterates often subscribe to newspapers and popular magazines even though they can not read them.

Circulant Distance Matrix for Circumplex II

	4	16	20	15	6	12
4	0	38	40	66	49	45
16	38	0	40	52	49	45
20	40	40	0	46	51	57
15	66	52	46	0	41	57
6	49	49	51	41	0	46
12	45	45	57	57	46	0

CIRCUMPLEX III



2. Illiterates tend to watch TV and listen to the radio less often than do literate adults.
8. Adult students prefer teachers of the all-business, no nonsense type.
17. Illiterates tend to have unrealistic hopes for their children's futures.
5. Students usually know the alphabet before they begin literacy instruction.
14. Adult illiterates who are Negroes usually show little interest in the Civil Rights movement.
1. Teachers find it difficult to hold the interest of adult literacy students.

Circulant Correlation Matrix for Circumplex III

	2	8	17	5	14	1
2	1.0	130	-165	-683	165	241
8	130	1.0	377	-094	-322	094
17	-165	377	1.0	161	-325	-296
5	-683	-094	161	1.0	016	-256
14	165	-322	-325	016	1.0	258
1	241	094	-296	-256	258	1.0